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NATIONAL ACADEMY OF SCIENCES
NATIONAL RESEARCH COUNCIL

DIVISION OF BIOLOGY AND AGRICULTURE

Report on Travel Grants Activity of U. S. National Committee for Pure and Applied Biophysics, NAS-NRC

Naples, Italy, September 8-11, 1965

As a part of its program in support of international activities in biophysics, the U. S. National Committee for Pure and Applied Biophysics sought, from several Federal granting agencies, funds which might assist U. S. scientists to attend the Symposium on Some Biological Systems at the Molecular Level, held at Naples, Italy, in September of 1965. Grants in the amount of $9,000 from the National Science Foundation and $5,000 from the National Aeronautics and Space Administration were received. Additionally, a sum of $4,335 remaining from an earlier activity at Cold Spring Harbor, N.Y., was, with permission from the Office of Naval Research, re-allocated to the Naples project.

The following committee was named to screen applications received from persons wishing financial assistance in attending the Symposium:

Richard B. Roberts, Chairman
Carnegie Institution of Washington

Gerard Edelman
Assistant Dean of Graduate Studies
The Rockefeller University

C. L. Markert
Department of Biology
The Johns Hopkins University

H. K. Schachman
Virus Laboratory
University of California (Berkeley)

H. A. Scheraga
Department of Chemistry
Cornell University

A total of 79 applications were received, including the seven invited speakers. These were arranged alphabetically and forwarded to each member of the Selection Committee on May 5, together with data on economy fares at the time of the Symposium, 14-21 day excursion fare, amount requested by each applicant, and other relevant data. Each Committee member was asked to select 25 candidates and to place them in rank order of appropriateness for financial assistance. From these a consolidated list of 50 names was prepared, in rank order based on the number of "votes" received. The first 21 (three or more votes) were awarded grants; the next eleven (two votes) were considered as alternates. All others were advised that their applications could not be honored.

In memoranda of March 31 and May 4, applicants were urged to seek alternative ways of securing funds, in an effort to reduce the pressure on available travel grants money. In the final count, a total of 25 grants were proferred, of which 7 were declined or cancelled, leaving a paid total of eighteen. The amount supplied in each case was that necessary to provide jet economy round-trip fare, or the sum actually requested, whichever was the lesser. It was a condition of the grant that U. S. flag carriers be utilized.

Russell B. Stevens

Report to the

U. S. National Committee for Pure and Applied Biophysics,
National Academy of Sciences -- National Research Council

Concerning the Symposium, Some Biological Systems at the Molecular Level

Held in Naples, Italy, September 8-11, 1965

I. Organization and Attendance

The Symposium was organized by the Commission on Molecular Biophysics of the International Organization for Pure and Applied Biophysics. Its purpose was to bring together and promote fundamental discussions between scientists vitally interested in protein structure and function on the one hand and those concerned with problems of cellular differentiation on the other. In organizing the Symposium, the Commission chose one chairman for each day of the four-day meeting; and each chairman, in turn, picked three or four speakers to give formal presentations. These lectures were designed to acquaint the participants with the current status of a given specialty and to provide the bases for open discussions, for which ample time was provided.

The meetings were held in the "Palazzo dei Congressi" (Teatro Mediterraneo in the Mostra d'Oltremare, located in the Fuorigrotta section of northern Naples). The Symposium was held under the auspices of the nearby International Laboratory of Genetics and Biophysics whose Director, Professor A. Buzzatti-Traverso, made the local arrangements. The planned maximum attendance was set at 250.

Actually, the Symposium was attended by a total of 241 registered participants from 19 countries, including Romania, Czechoslovakia, Yugoslavia, India, Nigeria and Japan. Fifty-eight participants were United States citizens. This number does not imply that all the U.S. citizens came directly from the United States to attend the Symposium, since many of them had doubtless been in Europe for varying periods of time prior to the meeting. The country with the largest registered attendance was Italy, with a total of 59 names. Most of these came from the International Laboratory of Genetics and Biophysics and from the University of Naples.

The program went according to schedule, with only minor variations in the hourly schedule itself to accommodate certain local conditions. The one official social function was the reception by the City of Naples in the "Palazzo Reale"; unfortunately neither the Mayor nor the Vice-Mayor of the city was able to be present. Numerous evening parties in the homes of the Neopolitan participants provided opportunities for a considerable degree of informal scientific interchange.

II. Resumé of Sessions

The first day's sessions, under the chairmanship of Prof. H. A. Sheraga (Ithaca), explored the fundamental theoretical problem of predicting the conformations of proteins from their amino acid (AA) sequences. In the first paper, Dr. S. Lifson (Rehovoth) presented his recent statistical mechanical calculations of the conformational changes in polypeptides. The remaining theoretical papers by Prof. G. N. Ramachandran (Ann Arbor and Madras), Dr. G. Némenthy (New York) and Dr. A. M. Liquori (Naples) were concerned with calculating the interactions between non-bonded atoms that determine protein structure. As part of the resulting discussion, Dr. D. C. Phillips (London) and Dr. J. C. Kendrew (Cambridge, England)

then detailed the structures of lysozyme and myoglobin (as determined by X-ray diffraction) and indicated the regions of limited agreement with theory. One came away with the feeling that theory will some day be able to predict the possible (metastable) conformations from AA sequences.

The second day, under the chairmanship of Dr. G. M. Edelman (New York), took up the problems of antibody structure and synthesis. Dr. A. Nisonoff (Urbana) gave an extensive review of the multi-chain structures of antibody globulins and their ability to bind antigens. Although specific antibody directed to a single antigen is heterogeneous, it does appear that different specificities are correlated with different AA sequences and ratios. Prof. N. K. Jerne (Pittsburgh) then discussed the puzzling kinetics of appearance and disappearance of antibody-forming cells in response to the injection of antigen into the whole animal. Dr. M. Cohn (La Jolla) then discussed the antibody-forming capacities of individual cells: 90 to 95 per cent of the cells can make only one type of antibody whereas the animal from which they came can be immunized against at least 10^6 kinds of antigen. This led to a discussion of the germ line theory versus the soma theory of antibody formation, the latter depending on antigen-induced somatic mutations to provide the required versatility, while the former theory proposes that each cell has a genetic inductive capability (possibly predetermined during development) of responding or not responding when exposed to a given antigen.

The third day, with Dr. F. Jacob (Paris) as chairman, concerned itself with allosteric enzymes. Dr. J. Wyman (Rome) started the discussion with the description of experiments on hemoglobin and its α and β chains, using the hemoglobin molecule as an excellent example of allosteric transformations. Dr. J. Monod (Paris) gave essentially a review paper on the model proposed by him (with Wyman and Changeux) of the states of allosteric enzymes and of their change of state as a function of the binding of substrate activator and inhibitor. Monod's paper was followed by a vigorous discussion by many people. Dr. H. K. Schachman (Berkeley) gave a lucid paper on the enzyme worked with by him and Gerhart: aspartate transcarbamylase. The paper showed rather convincingly that this enzyme exists in the form of multiple subunits. There appears to be a catalytic subunit and a regulatory subunit; neither performs the full function of the enzyme by itself, but the two may be combined in vitro to act as a complete enzyme.

On the final day certain problems of differentiation were discussed, with Prof. J. Brachet (Brussels) as chairman. Prof. A. Monroy (Palermo) talked about a comparison of the capacity of ribosomes from unfertilized and fertilized eggs to participate in in vitro protein synthesis. Unfertilized eggs have low capacity, while fertilization increases the ribosomal activity. Since trypsin treatment of ribosomes from unfertilized eggs increases their synthetic power, Monroy suggests that they are accompanied by a protein inhibitor. Dr. D. D. Brown (Baltimore) talked about the time sequence of the capacity of fertilized amphibian eggs to make DNA, RNA and protein. Indications are that only at gastrulation does the RNA synthesis, and subsequent protein synthesis, start. The paper was well presented and elicited much discussion. Dr. H. G. Schweiger (Wilhelmshaven) showed that the cells of acetabularia have a kind of memory for cycles of light and dark. The general conclusion was that the nucleus is responsible for the maintenance of this memory. Dr. L. Sachs (Rehovoth) discussed cell transformation, particularly as elicited by polyoma virus. The most interesting part of his paper was his demonstration that some of the cyclic hydrocarbons acting upon the mammalian cells in tissue culture would effect transformation.

The general conclusion was that the meeting was highly successful in accomplishing its purpose. It brought together a relatively small group of scientists, most of whom were in their 30's, to discuss scientific questions in great detail. Six Nobel Prize winners attended, and one of the chairmen and one of the speakers were to be so honored within the year. The arrangements were such that there was ample time for discussion from the floor and also ample time for small conversations in the adjacent corridors. As it turned out, everyone who wanted to come and could finance his trip was able to attend. The great vacuum in the attendance was from the USSR and its satellite countries. No one from the USSR was present, and only four scientists from Hungary, Czechoslovakia, Yugoslavia and Poland combined.

It is noteworthy that interest remained at such a high level throughout, that almost all the participants remained for all four days. An excellent report on the Symposium has appeared (Askonis, Butler, Jacob, Phillips, Sachs and Sherbet, Nature 208: 1048-1050 [1965]).

III. Meeting of the Commission on Molecular Biophysics, September 8 and 9, 1965

A. Members Present

Prof. Robley C. Williams, President (U.S.A.)
Prof. J. A. V. Butler, Secretary (U.K.)
Prof. T. F. Anderson (U.S.A.)
Dr. W. Arber (Switzerland)
Prof. A. A. Buzzatti-Traverso (Italy)
Dr. A. Gierer (Germany)
Prof. F. Hercik (Czechoslovakia)
Prof. M. H. F. Wilkins (U.K.)

B. A proposal from Dr. E. R. Blout (Harvard) to organize a Sub-Commission on Biopolymers was discussed at length. Rather than invite premature fragmentation of the Commission, it was proposed to nominate two representatives of the biopolymer field to the Commission. Subject to approval of the Council of IOPAB, the following would be invited to join the Commission:

Dr. H. K. Sheraga, Department of Chemistry, Cornell University, Ithaca, New York, U.S.A.
Dr. S. Lifson, Weizmann Institute of Sciences, Rehovoth, Israel.

C. The Commission will be responsible for a three-hour Symposium at the International Congress on Biophysics at Vienna, September 5-9, 1966. It was agreed that the Symposium should consist of three lectures discussing latest developments in Protein Structures and that its organization be the responsibility of Prof. M. H. F. Wilkins.

D. The Commission plans to meet next during the Vienna Congress.

Respectfully submitted,

Robley C. Williams
Thomas F. Anderson

RCW,TFA/de